

NOTES ON POLYPLACOPHORA, CHIEFLY AUSTRALASIAN. (PART I.)

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Read 14th January, 1910.

SINCE the publication of Pilsbry's Monograph in the *Manual of Conchology* much work has been done in the study of Australasian Polyplacophora. Pilsbry himself described many species from material supplied by Dr. Cox and Mr. Bednall: he wrote up the Port Jackson Chiton fauna, and reviewed the Australian Acanthochitidæ (Proc. Acad. Nat. Sci. Philad., 1894, pp. 69 et seq.). A collection of Chitons from Port Phillip, Victoria, was, very shortly afterwards, worked through by Mr. E. R. Sykes, the only recent work on Australian Chitons published in England. In that paper (Proc. Malac. Soc., 1894, vol. i, pp. 84 et seq.) much was done in clearing up obscure points through Mr. Sykes having access to the British Museum, where the types of early and indefinitely described Australian species are preserved. A splendid account of South Australian Chitons followed from the pen of Mr. W. T. Bednall (Proc. Malac. Soc., 1897, vol. ii, pp. 139 et seq.), whilst the Neozelanic forms were listed by Mr. Suter in the same periodical (1897, vol. ii, pp. 183 et seq.). Since then the work has been assiduously carried out all over Australasia with very gratifying results. As well as Mr. Bednall and Mr. Matthews, Messrs. Torr, Ashby, and Maughan have contributed to the South Australian list; Messrs. Gabriel and Gatliff have been searching Victorian waters; Mr. A. F. Basset Hull has been working Port Jackson, New South Wales, and in addition has investigated Norfolk and Lord Howe Islands. As regards Queensland, Mr. Hedley has collected on the Great Barrier Reef, whilst Dr. Torr and I have made small but interesting collections at Port Curtis and Caloundra. In New Zealand much collecting has been done by Miss Mestayer, Captain Bollons, Messrs. Murdoch, Webster, Suter, and myself. In addition I have obtained interesting species from the Kermadec Group. In spite of all this work there were species admitted to the Australasian fauna only represented by unique examples in the British Museum, as for instance, *Spongiochiton productus*, Pilsbry, *Plaxiphora obtecta*, Pils., *Plaxiphora egregia*, H. Ad., *Acanthochites carinatus*, Ad. and Ang., and *Chorioplax Grayi*, Ad. & Ang. In addition, species described by Blainville, Quoy & Gaimard, Filhol, and Rochebrune had not been recognized, and the types, if in existence, needed examination. Upon inquiring of Dr. L. Germain, of Paris, he courteously proffered to oblige me with such as were in existence, but pointed out that Dr. Thiele had just recently studied them. I immediately wrote to Dr. Thiele, who graciously forwarded me a copy of his work which he had just completed. Though unable to agree with all his conclusions, this work must be regarded as the most important contribution to the literature of the Polyplacophora since the publication of Pilsbry's monograph. Having worked over the same ground as myself, I find many of my conclusions anticipated, such as the transference of

Wahlbergi, Krauss, from *Plaxiphora* to *Onithochiton*, separation of *Plaxiphora Fremblyi*, Brod., from *setiger*, King., publication of *Plaxiphora Pæteliana*, Thiele, *Onithochiton Scholviemi*, Thiele, etc. As I had concerned myself principally with specific determinations, I am enabled to add to some of his notes and confirm others, whilst with very few I disagree. This paper is a medley of notes covering all the genera of the Polyplacophora, and will be succeeded by further contributions on the same lines. I have just received a paper on Port Jackson Chitons by my good friends Messrs. Hedley and Hull, and find they have notes on two of the species here treated.

I wish to thank Mr. E. R. Sykes for the pleasure of examining well-authenticated Australian *Plaxiphora*.

ISCHNOCHITON GRYEI (Filhol).

- Tonicia Gryei*, Filhol, Comptes Rendus, 1880, vol. xci, p. 1095.
Lepidopleurus melanterus, Rochebrune, Bull. Soc. Philom. Paris, 1883-4, p. 37.
Ischnochiton Parkeri, Suter, Proc. Malac. Soc., 1897, vol. ii, p. 186, figs. in text.
I. fulvus, Suter, Journ. Malac., 1905, vol. xii, p. 66, pl. ix, figs. 5-10 ; Iredale, Trans. N. Zeal. Inst., 1907 (1908), vol. xl, p. 373.

In 1880 Filhol described (?) a shell which he had collected at Campbell Island under the name *Tonicia Gryei*. Later Rochebrune described (?) a shell which Filhol had collected at Campbell Island under the name *Lepidopleurus melanterus*. Both descriptions were inadequate, and in each case the generic disposition inaccurate.

I received from the Paris Museum a bottle containing a large number of shells with Rochebrune's label attached to them. The whereabouts of Filhol's shells was unknown. As these shells answer Filhol's description, such as it is, I consider they are the original lot, and in justice to Filhol as the collector as well as describer, they should bear his prior name.

Thiele, having examined these same shells, has declared the identity of *Parkeri*, Suter, and *fulvus*, Suter, with them (Zool. Chun, Heft. lvi, p. 111). Previous to the receipt of Thiele's work and the Paris shells I had found myself unable to separate *Parkeri*, Suter, and *fulvus*, Suter.

ISCHNOCHITON SULCATUS (Q. & G.).

- Chiton sulcatus*, Q. & G., Voy. Astrolabe, Zool., 1834, vol. iii, p. 385, pl. lxxv, figs. 31-6.
C. decussatus, Reeve, Conch. Icon., 1847, pl. xviii, fig. 107.
C. castus, Reeve, op. cit., pl. xxii, fig. 145.
Lepidopleurus speciosus, Ad. & Ang., P.Z.S., 1864, p. 192; 1865, p. 187.
Gymnoplax Urvillei, Rochebrune, Bull. Soc. Philom. Paris, 1880-1, p. 121.
Ischnochiton sulcatus, Q. & G.: Pilsbry, Man. Conch., 1893, ser. 1, vol. xiv, p. 138, pl. xxxviii, figs. 24-6.
I. decussatus, Reeve: Bednall, Proc. Malac. Soc., 1897, vol. ii, p. 146.

The whereabouts of the type of Quoy & Gaimard's species was unknown, but examination of the type of Rochebrune's *Urvillei* showed that that name was founded upon it. The shell was easily recognized from Quoy's beautiful figures, though no one would have guessed it from Rochebrune's description. Apparently the label had been lost, and without referring to the "Voy. de l'Astrolabe" Rochebrune renamed it, hiding its identity under a careless diagnosis!

Thiele has already pointed out that *Urvillei*, Roche. = *decussatus*, Reeve (Zool. Chun, 1909, Heft lvi, p. 8). Examination of the types of the species denoted as synonymous absolutely confirms this, but strangely the species from the Swan River named *castus*, Cpr. MS., and whose description is given in the Man. Conch., vol. xiv, p. 94, is quite distinct, and is either a good variety or species according to whether it is the only form on the Westralian coast.

PLAXIPHORA CÆLATA (Reeve).

Chiton cælatus, Rve., Conch. Icon., 1847, pl. xvii, fig. 101.

C. (Plaxiphora) terminalis, Smith, Voy. Erebus and Terror, Moll., 1874, p. 4, pl. i, fig. 13.

This synonymy is not novel, having been published by Suter (Proc. Malac. Soc., 1897, vol. ii, p. 189), and I had not intended to remark upon it. But Thiele has published a new species, *Schauinslandi* (Zool. Chun, 1909, Heft lvi, p. 28, pl. iii, figs. 41-3), which has induced me to record these details of the types. The tablet which bears Reeve's name has on it four specimens, the first one of which appears to be the shell from which Reeve's figure was prepared.

The tablet which contains Smith's typical specimens has six shells of varying sizes. A shell of the same size as Reeve's type was critically compared with it and found inseparable. The largest shell, which to me was certainly conspecific, showed finer sculpture and differences consistent with increased age and growth. When Smith separated his *terminalis* he was using shells marked *cælata*, Rve. (= *cuprea*, Cpr.), for comparison. These, as I presently show, were *biramosa*, Q. & G. Thiele's figures and description of his *Schauinslandi* agree perfectly with this large *terminalis*, and if it should be found later necessary to separate it, then the prior *terminalis* must be used, so that in any case *Schauinslandi* is a synonym.

PLAXIPHORA OBTECTA, Pilsbry.

In the Nachr. deutsch. malak. Ges., 1909, vol. xli, p. 72, Suter, correcting Wissel's identifications (!) (Zool. Jahrb. Syst., 1904, xx, pp. 591-662) of New Zealand Chitons, has accepted the identity of the later-named *P. Suteri*, Pils., from which view he had previously dissented. He still retains in the synonymy of this species, however, *Mopalia ciliata*, Sow., of Hutton's Manual, p. 116. In that place Hutton quotes Reeve's figure, and copies Reeve's description. Reeve figured a shell like *cælata*, and states New Zealand (Earl). No one could confuse Reeve's figure with the shell

under notice, and I would transfer *Mopalia ciliata*, Sow., of Hutton's Manual, p. 116 (not of Sowerby), to *calata*, Reeve.

When Pilsbry took up Carpenter's description of *Guildingia oblecta* he did not fully grasp the idea of the shell, otherwise he would not have written (Man. Conch., ser. i, vol. xiv, pp. 329-30)—“This section, like *Fannettia* in the genus *Tonicia*, rests upon a character of very little taxonomic value.” “It is, however, simply an exaggeration of *P. terminalis*.” The species is quite unlike *terminalis* from whatever point of view it is examined, and stands quite aloof from all other Australasian *Plaxiphora* in being quite smooth.

PLAXIPHORA EGREGIA (H. Adams).

Frembleya egregia, H. Ad., P.Z.S., 1866, p. 445, pl. xxxviii, fig. 9.

Acanthochætes ovatus, Hutton, T.N.Z.I., 1872, vol. iv, p. 182; 1880, Man. N.Z. Moll., p. 177.

Plaxiphora egregia, H. Ad.: Pilsbry, 1893, Man. Conch., ser. i, vol. xiv, p. 331, pl. lxxv, figs. 81, 82.

P. ovata, Hutton: Pilsbry, loc. cit., p. 332, pl. liv, figs. 34-40; Suter, Proc. Malac. Soc., 1897, vol. ii, p. 192; Iredale, T.N.Z.I., 1907, vol. xl, p. 375, pl. xxxi, fig. 1 (abnormal specimen) (1908).

Fremblyla ovata, Hutton: Thiele, Zool. Chun, 1909, Heft lvi, p. 29, pl. iii, figs. 50-2.

Fremblyla egregia, H. Adams, described and figured in 1866 from “unknown habitat”, appears to have received very little attention since. In 1872 Hutton described a New Zealand shell as *Acanthochætes ovatus*.

In 1893 Pilsbry included both under *Plaxiphora*, reducing *Fremblyla* to sectional rank. To *egregia* he allotted an Australian habitat on Carpenter's MSS. “collected by Dieffenbach, Newcastle, Australia”, and as a synonym gave *Streptochiton tortuosus*, Cpr. MSS. olim. He also gave Carpenter's manuscript detailed description of the type. In the British Museum are the type tablet and three other tablets, one marked “Newcastle, Australia, Dieffenbach”, and the two others from New Zealand. All these last three are labelled *S. tortuosus*, Cpr., in Carpenter's handwriting.

As Dieffenbach collected largely in New Zealand, I consider it feasible to suppose that an erroneous label has been attached to the shells, as otherwise it is unknown from Australia, and I do not consider it should be included in Australian lists.

There can be no doubt that all the specimens are conspecific, and as *egregia* has priority it must replace the familiar *ovata*.

Thiele has reinstated *Fremblyla* as a full genus, but I cannot yet see characters sufficiently strong to cause me to follow him.

PLAXIPHORA BIRAMOSUS (Q. & G.).

Chiton biramosus, Quoy & Gaimard, Voy. Astrolabe, Zool., 1834, vol. iii, p. 378, pl. lxxiv, figs. 12-16.

Tonicia corticata, Hutton, T.N.Z.I., 1872, vol. iv, p. 180.

Plaxiphora biramosus, Q. & G.: Hutton, Man. N.Z. Moll., 1880, p. 116.

P. biramosa, Q. & G.: Pilsbry, Man. Conch., 1892, ser. 1, vol. xiv, p. 319, pl. lxxviii, figs. 51-4; Suter, Proc. Malac. Soc., 1897, vol. ii, p. 188; Thiele, Zool. Chun, 1909, Heft lvi, p. 26, pl. iii, figs. 37, 38.

Governed by Quoy's figures, which to me showed a smooth shell, and which his description does not contradict, I had identified a smooth *Plaxiphora* as *biramosa*. Having done this, I could not separate from that species Suter's *subatrata*, which seemed synonymous with the prior *Campbelli* of Filhol.

Upon examination of the shells in the British Museum, I found that all the shells I would have referred to *biramosa*, Q. & G., were marked *superba*, Cpr., in agreement with his type. Another shell which I did not know was marked *calata*, Reeve = *cuprea*, Cpr., but it was unlike the type of *calata*, Reeve. I soon made it out to be the shell Suter called *biramosa* in the Proc. Malac. Soc., vol. ii, p. 188, and whose description of a corrugated shell had always puzzled me.

I re-read Quoy's account and noted that he pointed out that the shells he had differed in form externally. The puzzle was now easily unravelled, as, by allowing Quoy to have had both a corrugated and smooth shell, the history reads thus.

Hutton in 1872 had not access to Quoy, and from Deshayes culled his account of *biramosus*. He then introduced his *Tonicia corticata* as a new species. His description of this shell makes it very easy to identify the corrugated shell Suter adopted as *biramosa*. It is true that many years later Hutton thought a much damaged shell, which turned out to be *Acanthopleura granulata*, Gm., was his *corticata*, but the description of the latter species agrees minutely with the corrugated *biramosa*, whilst it disagrees just as completely with *granulata*. In 1880, with access to Quoy, Hutton included *corticata* as a synonym of *biramosa*, and states "Reeve is quite wrong in uniting this species with *C. setiger*, King".

In 1892 Pilsbry, knowing neither the smooth nor corrugated shell, added to Quoy's *biramosa* a smooth shell described in MS. by Carpenter as *superba*. He doubted Hutton's attachment of his *corticata* to *biramosa*, stating "in sculpture it [*corticata*] must resemble *P. terminalis*".

Suter in 1897, calling the corrugated shell *biramosa*, separated *superba* as a valid species, but not knowing it, save from the description, also described *subatrata*, which he noted might be *Campbelli* of Filhol.

With the receipt of Quoy's types to verify these conclusions, which I found to be correct, I also received Filhol's type of *Campbelli*. However, Dr. Thiele's work has anticipated me in this, as he had examined these types, and there found the two shells represented. He has followed Suter in restricting the name *biramosa* to the corrugated shell, and, as it is quite distinctive, no further confusion can possibly ensue.

In all its internal as well as external features it is quite easily separable from the other Australasian *Plaxiphora*. From the

stoutness of the valves and the length of the insertion plates it can be recognized as living well out in the breakers, occupying more exposed situations than the smooth shell *Campbelli*, Filhol, which usually accompanies it on the coasts of New Zealand.

PLAXIPHORA CAMPBELLI, Filhol.

Plaxifora Campbelli, Filhol, Compt. Rend., 1880, vol. xci, p. 1095.

Plaxiphora Campbelli, Filhol: Pilsbry, Man. Conch., 1893, ser. 1, vol. xv, p. 107.

P. superba (Pils.): Suter, Proc. Malac. Soc., 1897, vol. ii, p. 188.

P. subatrata, Pils.: Suter, loc. cit., p. 190.

Under *Plaxiphora biramosa*, Q. & G., Thiele (Zool. Chun, 1909, Heft lvi, p. 27) also works out this synonymy, and gives figures of the fifth and eighth valves of this species (pl. iii, figs. 39, 40). This is the only species of *Plaxiphora* I have seen from the Auckland and Campbell Islands, where it appears to be very abundant. It extends all over New Zealand, where, however, it is a rare shell.

PLAXIPHORA FREMBLYI (Broderip).

Chiton Frembleii, Brod., P.Z.S., 1832, p. 28.

C. setiger, var. *Fremblii*, Brod.: Sowerby, Conch. Ill., 1833, p. 7, fig. 4.

C. setiger, var. β , Reeve, Conch. Icon., 1847, pl. ix, fig. 48b.

Plaxiphora setiger, var. *Fremblyi*, Brod.: Pilsbry, Man. Conch., 1893, vol. xiv, p. 318.

Chiton Fremblyi, Brod.: Clessin, Conch. Cab., 1904, Heft xvii, p. 117, pl. xli, fig. 6.

Plaxiphora Fremblyi, Brod.: Thiele, Zool. Chun, 1909, Heft lvi, p. 23, pl. iii, figs. 12-14.

This species has been, owing to its rarity, deprived of its due until this year. Dr. Thiele anticipated me in restoring it to the place it deserves, and has given figures of the fifth and eighth valves of one of the type lot. Unfortunately the figure does not show the sculpture, and it is quoted as *P. setiger*, var. *Fremblii*, Brod., by Dall (Proc. U.S. Nat. Mus., 1909, vol. xxxvii, p. 246) immediately after he had received Thiele's paper.

It is quite unlike 'setiger', being a South American representative of the Australian corrugated *Plaxiphora*, having exactly the same coloration as is there commonly met with.

The girdle is very wide, thin, horny, and sparsely scattered over with hairs not at all like the girdle of 'setiger'. The head-valve is eight-ribbed and *concentrically closely sulcate*.

In the median valves the lateral areas are defined by an indistinct raised rib, and are *closely longitudinally wrinkly sulcate*, the central areas are smooth, and the sides of the pleura are *zigzagly sculptured* from the lateral rib. This sculpture is well marked, and nothing like it is shown in the many specimens of 'setiger' I have examined. Moreover, the valves are rounded, whereas every 'setiger' is very distinctly keeled.

Pilsbry believed *C. Hahni*, Roche., to be identical, and gives reproductions of Rochebrune's figures under this species. I have seen the type of Rochebrune's species, and find that it is simply a 'setiger'.

PLAXIPHORA CARMICHAELIS (Wood).

Chiton Carmichaelis, Wood, Supp. Index Test., 1828, pl. i, fig. 10;

Gray, Spicil. Zool., July, 1828, pl. i, p. 6.

C. setiger, King, Zool. Journ., 1831, vol. v, p. 338.

The type tablet of *Carmichaelis*, Gray, bore two specimens, both about the same size, one straight and one curled. The latter was the one figured by Wood, whose name has priority. Sykes in his account of the Polyplacophora of South Africa pointed out that though Pilsbry doubted the accuracy of Gray's attachment of *setiger*, King, to *Carmichaelis* he had examined the specimens, and concluded that *setiger* must give way to *Carmichaelis*, which must be crossed off the South African list. There are many specimens of *setiger*, King, from King's collection in the British Museum, varying in size from that of *Carmichaelis* to specimens 40 mm. in length, and upon dissecting one of the small specimens for comparison with one of the types of *Carmichaelis* no points of difference could be detected. The external characters were absolutely identical. Hence the name *setiger*, King, must give way to *Carmichaelis*, Wood.

From South America and the Falkland Islands two very distinctly coloured shells are received, and I believe they must be separate species. I hope to refer to this later, but in the meantime the above names are absolutely synonymous through examination of the types.

Fig. 79 of pl. lxx in the Manual of Conchology, vol. xiv, was drawn from one of the type lot of King's shells.

PLAXIPHORA IN AUSTRALIA.

In the Manual of Conchology Pilsbry included *petholata*, Sowerby, to which he attached Adams & Angas's *conspersa*, as a variety upon Carpenter's MS., and *glauca*, Quoy & Gaimard, as Australian, with a new species of Carpenter, *excurvata*, as perhaps Australian members of the genus *Plaxiphora*. Neither *conspersa*, Ad. & Ang., nor *glauca*, Q. & G., had he seen. Later, dealing with Port Jackson Chitons, he only recorded *petholata*, Sow., from that locality. Sykes only allowed *petholata*, Sow., when he catalogued the Victorian Chitons. Bednall from South Australia recorded three species—*petholata*, Sow., *conspersa*, Ad. & Ang., and *glauca*, Q. & G.

By Australian students these were easily separated by superficial characters, *petholata*, Sow., being the common variable corrugated species, *conspersa*, Ad. & Ang., being a very distinctive small shell, and *glauca*, Q. & G., being a big smoothish shell. Only so-called *petholata*, Sow., was collected at Port Jackson by Mr. A. F. Basset Hull, and to him there appeared to be two species confused under that name. He asked me to look into the matter and find out which was Sowerby's species.

The types of Sowerby's *petholata*, as also the variety *porphyrius*, which has never been recognized, are, however, non-existent. Upon

examining the shells in the British Museum from various Australian localities I obtained nothing but contradictions. Awaiting news of the type of *glauca*, Quoy & Gaimard, I dissected a typical smooth shell from South Australia, determined as *glauca*, Q. & G., by Mr. W. T. Bednall. The tail-valve separated it at once from the Port Jackson corrugated *petholata*, Sow. However, Tasmanian shells from the Cuming Collection, labelled *petholata*, Sow., and recorded in the Man. Conch. under that name, were identical with the South Australian *glauca*.

Adams & Angas's type of *conspersa* was next dissected, and differed only slightly from the Port Jackson *petholata* in internal characters, though widely so in colour. Shells sent from Port Jackson as *conspersa* Ad. & Ang., were simply *petholata* of brighter coloration. The shells sent from South Australia by Bednall were, however, quite different from Adams & Angas's type, approaching *egregia*, H. Ad., more than any other Australian *Plaxiphora*.

Shells from Queensland turned out to be internally identical with the South Australian *glauca*, though externally faintly corrugated.

Victorian specimens, though of dark coloration, agreed better with *conspersa*, Ad. & Ang., than with *petholata*, Sow., from Port Jackson.

The two species indicated by Mr. Basset Hull appeared to be easily separable by means of the sculpture, and the second species I have not yet seen from any other locality than Port Jackson.

I had thus arrived at four Australian species when I received Dr. Thiele's "Revision des Systems der Chitonen", which caused me to review my specimens and results. Working upon the characters of the tail-valves similarly to myself, he has separated five species without considering either Adams & Angas's *conspersa* or Bednall's determination of that species. The work is most beautifully illustrated with splendidly drawn figures of the fifth and eighth valves of his species, which make their identification simple. However, through lack of specimens, he has laid too much stress upon the value of the shape of the valves. The shape varies quite considerably with age and environment, specimens living exposed to heavy breakers having much longer insertion plates, and being less elevated than those living a more secluded life. Young shells are also more strongly sculptured than older ones, and the shape of their valves shows differently. The big smooth *petholata*, commonly called *glauca*, Q. & G., has the young well sculptured.

Having examined the types of *costatus*, Blain., and *albidus*, Blain., these names are fixed by Thiele as applicable to the two common Australian *Plaxiphora*. He makes *petholata*, Sow., synonymous with the former, but the latter seems nearest to the commonly accepted *petholata*, Sow. The rejection of this well-known name, though repugnant, appears unavoidable, especially as the type is non-existent, and its features are obscure. Blainville's *costatus* is easily recognizable as the species I have above noted as *glauca*, Q. & G. The tail-valve seems distinctive. Blainville's *albidus* covers the majority of the shells commonly known in Australia as *petholata*, Sow., and is the shell Adams & Angas called *conspersa*.

Tasmanian specimens of *glauca*, Q. & G., differed slightly, and these he christens *Tasmanica* on account of the prior *glaucus*, Gray.

Dissecting shells received from Mr. Bednall under the name *glauca*, Q. & G., he makes them differ and calls them *Bednalli*. His figures did not appear to show sufficient characters to enable me to judge of their specific value, so I dissected a further number of Tasmanian and South Australian shells.

South Australian *glauca* were easily *costata*, but South Australian *petiolata* varied, some being *costata*, others *albida*, and others midway between *albida* and *Tasmanica*.

A number of Tasmanian shells furnished still more interesting results. One was a beautiful typical *Bednalli*, a second was nearer *Tasmanica*, whilst a bigger specimen, though undoubtedly the same species, had much longer insertion plates, and of course the shape of the valves differed. Some were corrugated, others smoothish, one South Australian example, though almost typically *albidus*, being very smooth, yet young. Young shells, wherever collected, differed among themselves, but not constantly, and it seemed useless to attempt to allocate them.

I am therefore compelled to advise the rejection of *Tasmanica* (= *Bednalli*), and cannot even advise its use as a varietal designation. Further study must be carried out in the field, and it is just possible that the habits of the animals may give clues which will enable the fixation of differential characters. From my studies I feel sure that no such features have yet been grasped.

Thiele's fifth species is the second Port Jackson species I have above indicated. He has named it *Peteliana*, and by means of the sculpture and form it seems well characterized. From the depressed form and long insertion plates it lives on more exposed situations than its companion. As the shells from Australia labelled *petiolata* and *glauca* have resulted in such mixed results, no correct synonymy of the new names can be drawn up. Suter (Journ. Malac., 1905, vol. xii, p. 66) has recorded *glauca*, Q. & G., from the Chatham Islands. It will be interesting to know to which species, if either, the Chatham Island shell has to be referred. Thiele has introduced a new species *Schauinslandi* from that locality, but that is clearly only a fine *caelata*, Reeve.

PLAXIPHORA COSTATA (Blainville).

Chiton costatus, Blain., Dict. Sci. Nat., 1825, vol. xxxvi, p. 548;

Pilsbry, Man. Conch., 1893, vol. xv, p. 105.

Plaxiphora costata, Blain.: Thiele, Zool. Chun, 1909, Heft lvi, p. 24, pl. iii, figs. 20, 21.

I have seen this shell from Queensland, Tasmania, and South Australia.

PLAXIPHORA ALBIDA (Blainville).

Chiton albidus, Blain., Dict. Sci. Nat., 1825, vol. xxxvi, p. 547;

Pilsbry, Man. Conch., 1893, vol. xv, p. 105.

C. glaucus, Q. & G., Voy. Astrolabe, Zool., 1834, vol. iii, p. 376, pl. lxxiv, figs. 7-11.

? *C. petholatus*, Sow., Mag. Nat. Hist., n.s., 1840, vol. iv, p. 289;
var. *porphyrius*, Sow., loc. cit.

Chatopleura conspersa, Ad. & Ang., P.Z.S., 1864, p. 193; P.Z.S.,
1865, p. 187.

Plaxiphora albida, Blain.: Thiele, Zool. Chun, 1909, Heft lvi, p. 24,
pl. iii, figs. 22, 23.

P. Tasmanica, Blain.: Thiele, loc. cit., p. 25, pl. iii, figs. 24-6.

P. Bednalli, Blain.: Thiele, loc. cit., p. 25, pl. iii, figs. 27-30.

Variouly alluded to as *petholata*, Sow., and *glauca*, Q. & G. I have seen this species from New South Wales, Victoria, South Australia, and Tasmania.

PLAXIPHORA PÆTELIANA, Thiele.

Plaxiphora Pæteliana, Thiele, Zool. Chun, 1909, Heft lvi, p. 26, pl. iii,
figs. 34-6.

This species I have only as yet seen from Port Jackson, New South Wales.

PLAXIPHORA MATTHEWSI, n.sp.

Plaxiphora conspersa (non Ad. & Ang.), Bednall, Proc. Malac. Soc.,
1897, vol. ii, p. 154.

Shell small, keeled, elevated, elongate oval, side slopes straight. The shells are usually covered with algæ, but the ground colour can be discerned as yellowish white, with longitudinal brownish markings. The anterior valve is eight-ribbed; the ribs are strong and crenulate the margin of the tegmentum. It is broad, very elevated, with the apex acute, and slightly recurved. The insertion plate is very short, thick, cut into by eight evenly spaced grooved teeth, thickened at the edges of the slits, convex internally. Externally, between the ribs, angularly corrugated. The median valves have the lateral areas indicated by a strong elevated rib which is nodose in young specimens. The posterior margin of the median valves is raised by a similar strong rib; between these two the slight sculpture is wrinkle V-shaped. The pleural areas are corrugately sculptured towards the sides, becoming smooth on the median areas. The sutural laminae broad, short, with the sinus narrow; highest about midway between sinus and edge, but in the fifth valve scarcely appreciable. The insertion plates are as in anterior valve, very short, thick, one slit agreeing with the lateral rib. The posterior valve is broad, the tegmentum narrow from sinus to mucro, which is terminal, acute, and elevated. The lateral area consists of a crescentic raised rib, in front of which is a concave portion, with an anterior elevation. The insertion plate is represented by a thick semicircular, slightly sinuated callus. The sutural laminae are broad, short, and almost straight. The internal coloration is white with the faintest bluish tinge.

In the dried specimens I have, the girdle is leathery, with hairs disposed in bundles at the sutures. I anticipate this description of the girdle will need emendation upon examination of fresh shells. It shows a posterior sinuation. Length of type, 22 mm.; breadth, 13 mm.

Hab.—South Australia.

Type in British Museum.

From the very short insertion plates it was easily deduced that it lived in sheltered places. Bednall, at the above reference, writes—“Occurs in company with the Ichnochitons under blocks of stone in comparatively smooth water,” and gives as localities—“North Arm, Port Adelaide on *Pinna* (Bednall): Sultana Bay, Yorke Peninsula, S.A. (Matthews & Bednall).”

This most interesting shell is by the peculiar characters of the tail-valve, which I have endeavoured to denote, nearest *egregia*, H. Ad. That species is the type of Adams' genus *Fremblyia*, and I should also so place this shell. Pilsbry reduced this to sectional rank, but Thiele has reinstated it as a full genus, so it will be very interesting to see whether this shell will bear out Thiele's conclusions. I have no spirit specimens. It stands quite apart from the other Australian corrugated *Plaxiphora*.

PLAXIPHORA EXCURVATA, Pilsbry.

Plaxiphora excurvata, Pilsbry, Man. Conch., vol. xiv, p. 327.

This species, described from Carpenter's MSS., is unfigured, and to me quite indeterminable. It is quoted—“This shell has a general external resemblance in size and shape to *P. cuprea*,” but is stated to be 70 mm. long by 39 broad. The largest specimen of *P. cuprea*, so named by Carpenter himself, is only 53 mm. by 34 mm., so that some error has crept in. The angle of divergence would also indicate a much higher shell than is usually met with among Australian *Plaxiphora*.

Until the type is re-examined it seems that this species must be ignored, as the name cannot possibly be allotted to either of the preceding four Australian species.

SPONGIOCHITON PRODUCTUS, Pilsbry.

Spongiochiton productus (Cpr.), Pilsbry, Man. Conch., vol. xiv, p. 26; vol. xv, p. 7.

Acanthochites Carpenteri, Pilsbry, loc. cit., vol. xv, p. 35, pl. i, figs. 14–22.

A shell supposed to be from New Zealand was named in MS. by Carpenter as *Spongiochiton productus*, new genus and new species. Though twice noticed previously in literature, the species was never published until Pilsbry took it up in 1892. With Carpenter's good manuscript description there were no figures.

Later Pilsbry came upon some drawings of a shell made under the direction of Carpenter. These were unnamed, localized as “Port Elizabeth, South Africa”, and as the measurements given differed Pilsbry described them as *Acanthochites Carpenteri*, allotted them to the section *Notoplax*, but recognized their similarity to *productus*, as he wrote—“Compare *Spongiochiton productus*.” This latter is quite unknown to New Zealand students, and the former to South African ones.

I intended to make drawings of *productus* when I recognized that *Carpenteri* was founded on such drawings. Of this there is not the slightest doubt.

As Thiele has just published a species of *Craspedochiton* from Mauritius, which is very closely allied to *productus*, it would seem the South African locality is more likely to be correct.

It will be noted that Pilsbry included the drawings under *Notoplax*.

My examination of the type has induced me to propose that it be relegated to *Craspedochiton*, using that name as a section of *Acanthochites*. My reasons are: the tail-valve of *productus* is essentially the same as that of *violaceus*, Q. & G., the type of *Loboplax*.¹ *Rubiginosus*, Hutton,² has been shown by Thiele³ to be typically a *Loboplax*, where Suter⁴ had previously referred it. But from *laqueatus*, Sow.,⁵ the type of *Craspedochiton*,⁶ that species can scarcely be separated. Indeed, I anticipate the reduction of *rubiginosus*, Hutton, to a synonym of *laqueatus*, Sow., when a longer series of the latter is examined. The ribbing of the head-valve of *Loboplax* is the chief character separating it from *Notoplax*; but, in a series of any species of *Loboplax* or *Craspedochiton*, that becomes faint, and in some cases obsolete. There seems no reason for the retention of *Notoplax*, when *Craspedochiton* is used as sectional under *Acanthochites*, which course has already been indicated by Smith.⁷

The difficulty of separating these *Acanthochites* into sections is well shown in Thiele's work. In the first part he generically uses *Spongiochiton*, *Loboplax*, *Notoplax*, and *Craspedochiton*. In the second he still retains *Craspedochiton*, but has eliminated *Loboplax* in favour of *Spongiochiton*, which he reduces to a sub-genus, whilst *Notoplax* becomes only a section of the latter. He had, however, introduced a new sub-genus and genus upon very slight characters, and these he retains. Our knowledge of the species of *Acanthochites* is too slight to form correct conclusions as to the variation in form in closely allied species, and at present the only safe way is to treat them broadly. A multiplicity of sections should not be founded on the variation of inconstant features. So few specimens of any Australasian *Acanthochites* have been handled, that it cannot be said that we know the limits of variation of any species.

ACANTHOCHITES CARINATUS, Ad. & Ang.

Acanthochites carinatus, Ad. & Ang., P.Z.S., 1864, p. 194; 1867, p. 224; Pilsbry, Man. Conch., vol. xv, p. 17.

This species, very definitely stated to have been found at Port Jackson, N.S.W., was never figured. Though a large and striking shell, it has never been refound. E. A. Smith (P.Z.S., 1891, p. 392)

¹ Pilsbry, Nautilus, 1893, vol. vii, p. 32.

² T.N.Z.I., 1871 (1872), vol. iv, p. 180.

³ Zool. Chun, 1909, Heft lvi, p. 38, pl. v, figs. 16, 17.

⁴ Journ. Malac., 1906, vol. xii, p. 68, pl. ix, figs. 12-17.

⁵ P.Z.S., 1841, p. 104.

⁶ Bern. Mittheil., 1853, p. 67.

⁷ Fauna and Geog. Maldive and Laccadive Archipel., vol. ii, p. 620.

examined the type, and reported that it seemed to be merely *A. discrepans*, Brown, a common European species. Pilsbry deemed this identification to need confirmation, as it was founded on an examination of external characters only.

I have disarticulated the specimen, and find there is no doubt whatever that the shell is simply *A. discrepans*, Brown. As all other European shells named by Adams as coming from Australia have been disallowed, I conclude *carinatus*, Ad. & Ang., must be omitted from the Australian lists, and must be added to the synonymy of *discrepans*, Brown.

ACANTHOCHITES (CRASPEDOCHITON) MARLÆ, Webster.

Acanthochites (Loboplax) Mariæ, Webster, T.N.Z.I., 1908, vol. xi, p. 254, pl. xx, figs. 1-11.

Loboplax Stewartiana, Thiele, Zool. Chun, 1909, Heft lvi, p. 37, pl. v, figs. 8-12.

I cannot separate Thiele's species from the one described very little earlier by Webster.

CHITON STANGERI, Reeve.

Chiton Stangeri, Reeve, Conch. Icon., 1847, pl. xxii, fig. 150; Hutton, Man. N.Z. Moll., 1880, p. 111.

Upon Hutton's suggestion Pilsbry included this species as a synonym of *C. canaliculatus*, Q. & G., Man. Conch., vol. xiv, p. 177. In 1897 Suter, revising the New Zealand Polyplacophora (Proc. Malac. Soc., vol. ii, p. 196), reintroduced it as a valid species for a specimen he had found at Lyttelton. He drew up a detailed description, pointing out how different it was from *canaliculatus*. Later I found also in Lyttelton Harbour two specimens, each of which were named for me by Mr. Suter from his specimen as *Stangeri*, Reeve. Examination of the type of *Stangeri*, Reeve, shows it to be merely *canaliculatus*, Q. & G., as Pilsbry placed it, and moreover very typically so, not even a variety.

CHITON SUTERI, n.sp.

Chiton Stangeri (non Reeve), Suter, Proc. Malac. Soc., vol. ii, p. 196.

At the place quoted Suter diagnoses this shell as follows: In size, shape, and coloration very much like *Chiton limans*, but differing on the following points. The ribs have no acute elevated grains, but are flattened. The tail-valve has very distinct, flatly nodulous ribs. The jugum is less acute, divergence 120° . The imbricating scales of the girdle are very small on both margins, larger in the middle, shining, not mucronated, and very faintly striated, the striæ being only visible under strong magnifying power. Length 13, breadth 8 mm.

Hab.—Lyttelton Harbour.

Type in Mr. Suter's collection.

This very distinct species is at present known by three specimens, all from Lyttelton Harbour. The shell I have used for comparison

with *Stangeri*, Reeve, is one named by Mr. Suter from his specimen described above. It is very slightly smashed and curled, and measures $11\frac{1}{2}$ mm. \times $7\frac{1}{2}$ mm. The pleural areas are sculptured with six sulci, widely spaced and extending right across; the dorsal ridge quite smooth. The valves are beaked. The feature which separates it immediately from *canaliculatus*, Q. & G., is the sculpture of the pleural areas. In Pilsbry's monograph the peculiar wavy sulci of that species is well shown in fig. 4 of pl. xxxvi. The sulci of *Suteri* are perfectly straight, and much fewer than in a *canaliculatus* of the same size. I should even consider it nearer *areus*, Reeve, than either *limans*, Sykes, or *canaliculatus*, Q. & G., but whatever it is compared with it is an easily separable shell.

CHITON HULLIANUS, n.n.

Chiton Torri, Hedley & Hull (*non* Suter), Rec. Aust. Mus., 1909, vol. vii, p. 262, pl. lxxiii, figs. 6-11.

In honouring Dr. Torr, Messrs. Hedley & Hull overlooked the fact that Mr. Suter (Proc. Malac. Soc., 1907, vol. vii, p. 295, fig. 2 in text) had anticipated them in attaching Torr's name to a *Chiton*. In the hope that they have not corrected this error I am venturing to suggest the above to designate this South Australian species. In connexion with it and *Coxi*, Pils., I wish to point out that Thiele has published a new species, *bellulus*, from New South Wales (Zool. Chun, Heft lvi, p. 93, pl. x, figs. 5-8). This species was compared by Thiele with *jugosus*, Gld., but not with *Coxi*, Pils. Upon looking in the British Museum for specimens of the latter species, I could only find one from South Australia. I noted that this specimen differed from my recollections of shells of *Coxi* collected in Port Jackson when in company with Mr. Basset Hull, so I did not use it for comparison. I therefore certainly agree with Messrs. Hedley & Hull's remarks concerning the relationships of *Hullianus* and *Coxi*. I would like to note that when at Caloundra, Queensland, I collected one specimen of a new species, which, being very closely related to *Coxi*, Pils., may be its northern representative. There can be no doubt that *bellulus*, Thiele, is the same as *Coxi*, Pils., from a study of Hedley & Hull's beautiful figures.

SCLEROCHITON CURTISIANUS (Smith).

Chiton (Ischnochiton) Curtisianus, Smith, Zool. Alert, 1884, p. 78, pl. vi, fig. D.

Ischnochiton Curtisianus, Smith: Pilsbry, Man. Conch., vol. xiv, p. 97, pl. xxiv, fig. 6.

Liolophura Curtisiana, Smith: Pilsbry, loc. cit., pp. 242, 333.

Enoplochiton Torri, Bastow & Gatliff, Proc. Roy. Soc. Vic., 1907, vol. xx, p. 27, pls. iii, iv.

Sclerochiton Curtisianus, Smith: Thiele, Zool. Chun, Heft lvi, p. 96, pl. x, figs. 29-35.

S. Aruensis, Thiele, loc. cit., p. 96, pl. x, figs. 36-41.

Smith's *Curtisianus*, described from Port Curtis, Queensland, was transferred to *Liolophura* by Pilsbry, who had seen no specimens. In

the description the tail-valve was noted, as follows: Tail-plate much thicker within along the posterior edge, which is roughened by fine cross striæ, there being no prominent teeth and, of course, no notches.

Dr. Torr collected specimens at the type locality, and they were described as *Enoplochiton Torri* by Bastow & Gatliff. I have examined a syntype of this species, as well as the types of Smith's species, and of the identity of these two there is no doubt.

Sclerochiton miles, Pilsbry, was closely allied, but seemed generically separable by the presence of a toothed insertion plate in the tail-valve. Dr. Thiele has, however, referred *Curtisianus*, Smith, to *Sclerochiton*, and figured this species as having the tail-valve, with a slit insertion plate. Moreover, he gave good figures of a new species, *Aruensis*, from the Aru Islands, which, from a series of *Curtisianus* I myself collected at the type locality, was easily recognized as simply a young, well-sculptured shell of that species. He figured the insertion plate of the tail-valve as toothed for that species also.

Re-examination of the types of that species confirmed Smith's description, so I thereupon dissected some of my own shells, with the result that teeth were easily discernible, as in Thiele's specimens. I conclude that the method of dissection may have had something to do with the apparent lack in the types. I accordingly confirm Thiele's disposition, and add that specimens are present in the British Museum from Thursday Island. Bastow & Gatliff's reference of the species to *Enoplochiton* needs no consideration, as the type of that genus differs in every essential feature.

Hedley & Hull (Rec. Aust. Mus., 1909, vol. vii, p. 265) have noted that *Torri*, Bastow & Gatliff, is a synonym of *Curtisiana*, Smith, but misled, as I was, by the described character of the tail-plate, have transferred it to *Liolophura*. Re-examination of fresh specimens will certainly enable them to confirm its present generic disposition. Pilsbry reduced *Sclerochiton* to sectional rank under *Chiton*, but from examination of the type of this species and a Ceylon species I agree with Thiele in separating it as a valid genus.

ONITHOCHITON QUERCINUS (Gould).

Chiton quercinus, Gould, Proc. Bost. Soc. Nat. Hist., 1846, vol. ii, p. 142; U.S. Expl. Exped. Moll., p. 312, figs. 437, 437a; Otia Conch., p. 3.

C. (Onithochiton) quercinus, Gould, Otia Conch., p. 242.

C. Incii, Reeve, Conch. Icon., 1847, No. 94, pl. xvi, fig. 96, det. fig. 94.

Onithochiton rugulosus, Angas, P.Z.S., 1867, pp. 115, 223, pl. xiii, fig. 29.

O. Incei, Angas, P.Z.S., 1867, p. 223.

O. Lyellii (non Sow.), Pilsbry, Man. Conch., vol. xiv, p. 248 (*pars*).

O. quercinus, Gould: Pilsbry, loc. cit., p. 248, pl. lv, figs. 12, 13.

O. rugulosus, Angas: Pilsbry, loc. cit., p. 294, pl. lv, fig. 19; Proc. Acad. Nat. Soc. Phil., 1894, p. 88.

O. Incii, Reeve: Thiele, Zoologica Chun, Heft lvi, p. 99, pl. x, figs. 62, 63.

The last word on the *Onithochitons* of New South Wales is that by Pilsbry when he accepted "two species or at least forms" which he designated *rugulosus*, Angas, and *quercinus*, Gould, with the saving clause "Probably intergrades with the preceding" attached to the latter. That his caution was justified I am confident. In the first place, examination of the types of *rugulosus*, Angas, and *Incii*, Reeve, prove these names to be synonymous, with priority in favour of the latter. However, the figures of Gould are good enough to enable the identity of *Incii*, Reeve, and his *quercinus* to be established, so that of the published names *quercinus*, Gould, becomes the correct one to use.

Onithochiton Lyellii, Sow., has been quoted from Australia, but it is a Pitcairn Island shell, quite distinct, though no doubt closely allied. I have closely examined many specimens from New South Wales and Queensland, and though there sometimes appear the two forms quoted by Pilsbry I cannot keep them separate. However, *rugulosus*, Angas, is *absolutely* identical with *Incii*, Reeve, and cannot be used for a form, the latter having priority. My examination of Reeve's type leads me to say the same when it is compared with Gould's figures of *quercinus*.

Thiele has pointed out at the quotation given that *Incii*, Reeve, is distinct from *Lyellii*, Sow. On the same page he introduces a new species of *Onithochiton* as from New South Wales, which I comment upon in the succeeding note.

ONITHOCHITON SCHOLVIENI, Thiele.

Onithochiton Scholvieni, Thiele, Zool. Chun, 1909, Heft lvi, p. 99, pl. x, figs. 60-1.

Upon a tablet in the British Museum labelled *Onithochiton Incii*, Reeve, were four specimens of a large new *Onithochiton*. They were quite dissimilar to that species, and I had dissected one to prepare a description. Upon receipt of Dr. Thiele's paper I recognized at once my shell under the above name. I only wish here to draw attention to the locality of Dr. Thiele's specimens. They were supposed to have come from New South Wales, but I cannot believe that. The specimens in the British Museum are labelled "West Australia", which seems to me more correct.
